

PATENT

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re application of:

Paul Goodall et al.

Group Art Unit: 1731

Serial No. 10/044,399

Examiner: P. Chin

Filed: November 07, 2001

For: METHOD AND ARRANGEMENT IN TAIL  
THREADING IN A PAPER MACHINE

Attorney Docket No. 11001.086

I hereby certify that this correspondence is being deposited with the United States Postal Service as first-class mail in an envelope addressed to: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450 on

December 16, 2003

Date of Deposit

Christopher J. Fildes

Registered Attorney

  
Signature

TRANSMITTAL OF CERTIFIED COPY

Commissioner for Patents  
P.O. Box 1450  
Alexandria, VA 22313-1450

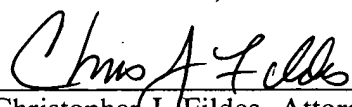
Sir:

Enclosed is a copy of the priority document, Finish application no. 20002532 filed November 17, 2000, for the referenced application.

Respectfully submitted,

Paul Goodall et al.

Fildes & Outland, P.C.

  
Christopher J. Fildes, Attorney  
Registration No. 32,132  
20916 Mack Avenue, Suite 2  
Grosse Pointe Woods, MI 48236  
(313) 885-1500

PATENTTI- JA REKISTERIHALLITUS  
NATIONAL BOARD OF PATENTS AND REGISTRATION

Helsinki 10.10.2001

ETUOIKEUSTODISTUS  
PRIORITY DOCUMENT



Hakija  
Applicant

Valmet Corporation  
Helsinki

Patenttihakemus nro  
Patent application no

20002532

Tekemispäivä  
Filing date

17.11.2000

Kansainvälinen luokka  
International class

D21F

Keksinnön nimitys  
Title of invention

**"Method and arrangement in tail threading in a paper machine"  
(Menetelmä ja sovitelmä päänviennissä paperikoneella)**

Hakijan nimi on hakemusdiaariin 18.02.2001 tehdyn nimenmuutoksen jälkeen **Metso Paper, Inc.**

The application has according to an entry made in the register of patent applications on 18.02.2001 with the name changed into **Metso Paper, Inc.**

Täten todistetaan, että oheiset asiakirjat ovat tarkkoja jäljennöksiä patentti- ja rekisterihallitukselle alkuaan annetuista selityksestä, patenttivaatimuksista, tiivistelmästä ja piirustuksista.

This is to certify that the annexed documents are true copies of the description, claims, abstract and drawings originally filed with the Finnish Patent Office.

  
Pirjo Kaila  
Tutkimussihteeri

Maksu 300,- mk  
Fee 300,- FIM

Osoite: Arkadiankatu 6 A Puhelin: 09 6939 500 Telefax: 09 6939 5328  
P.O.Box 1160 Telephone: + 358 9 6939 500 Telefax: + 358 9 6939 5328  
FIN-00101 Helsinki, FINLAND

## METHOD AND ARRANGEMENT IN TAIL THREADING IN A PAPER MACHINE

The present invention relates to a method and arrangement in tail threading in a paper machine, in which the paper web is  
5 overdried in production by means of many dryer groups consisting dryer section, and in which in the starting phase the threading tail is led from one stage to the next through the paper machine to the reeler, after which the threading tail that has been taken to the reeler is spread to its full width  
10 for production.

Web breaks in a paper machine lead to a need to rapidly restart production. If production is started by taking the tail end of the web from the drier section to the reeler, tail threading  
15 problems arise, particularly in overdried newsprint and SC paper machines, where the moisture content of the paper is 2,5% - 4,0%. The problems are caused by the manufacturing process requirements for the paper grades in question. The web is overdried, to allow it to be profiled to an even quality.  
20 Overdrying causes tension in the web. When using machines with a single-fabric dryer section, the web is supported firmly against the drying fabric, by means of vacuum rolls and blow-boxes. This gives no opportunity for the release of the cross-direction tension in the web. Thus, the inelasticity of the web  
25 caused by the unsuitable moisture level often results in the web splitting when it is being spread onto the reeler, thus lengthening the duration of the break.

Nowadays, to permit successful tail threading, the moisture  
30 percentage of the paper is increased during tail threading, by reducing the steam pressure in the dryer cylinders. This creates the flexibility and elasticity in the paper, which are required for successful tail threading. Once the web has been successfully spread onto the reeler, the steam pressures in the  
35 dryer cylinders are increased to their production values. The cooling of the dryer cylinders and the return of their pressures to production levels make this is an operation that

creates further delays, resulting in a great deal of bottom-end and break rejects and a loss of production time.

The invention is intended to achieve a method and arrangement  
5 by means of which the moisture content of the paper can be increased to a suitable level (4 - 8 %, preferably 5 - 6%) while threading the tail and spreading it onto the reeler, so that the equipment in the dryer section can be kept operating continuously during production, at the values required by  
10 production. The characteristic features of the method according to the invention are stated in the accompanying Claim 1 and the characteristic features of the arrangement are stated in the accompanying Claim 4.

15 The spraying of water onto the paper is a more direct measure than the previous method, because the web is either moister when the spray valve is open or drier when the spray valve is closed. When the wetting-spray is opened during a reeler break, bottom-end and break rejects during the delay in the change in  
20 the steam pressure in the dryer-cylinder are entirely eliminated. If the wetting-spray is dimensioned according to the running speed of the machine and the grammage, a wetting window can be accepted, in which the same wetting creates a moisture content of 8 % in smaller grammages and a moisture  
25 content of 6 % in larger grammages, at the same machine speed.

In the following, the invention is disclosed in detail, with reference to the accompanying drawings, which show a paper machine and the location of the wetting device in it.

30

Figure 1 shows a diagrammatic view of a paper machine,

Figure 2 shows a partial view of the installation of a wetting device according to the invention  
35 in a paper machine

## 3

Figure 1 shows a paper machine in a diagrammatic view according to the invention. The machine comprises a web-formation section 10, a press section 11, a multi-stage dryer section 12, and a reeler 13. The dryer section 12 includes dryer cylinders 16, vacuum rolls 18, dryer fabrics 20 supporting the web, and rewetting devices 14. Usually, dryer section 12 is divided into dryer groups 12n divided by the fabric 20 where the amount of dryer groups 12n in overdried paper machines is typically 6 - 9. Each of dryer groups includes 4 - 6 dryer cylinders 16. The rewetting devices 14 for evening the moisture profile are located at the end of dryer section 12, in such a way that there are still 2 - 4 dryer cylinders 16 after them. In Figure 1 the location of the wetting device according to the invention is marked with the reference number 15. In this case, the wetting device is located at the 19th dryer cylinder to the middle dryer group 12nc.

Figure 2 shows a partial view of the dryer section 12 of the paper machine. The movement of the paper web through dryer section 12 is supported by fabric 20, blow boxes 21 situated between the cylinders 16, and vacuum rolls 18. Doctor devices 19, which are situated underneath cylinders 16, are used to keep the dryer cylinders 16 clean.

In the middle of dryer section 12, wetting device 15 is attached in front of the frame of the doctor 19. The doctor is preferably a hose loaded DST doctor, because, its doctoring precision is the best. If a web break is caused by the water spray of wetting device 15, a DST doctor will scrape the web off better, if it has adhered to cylinder 16, and guide it away more safely from the surface of cylinders into the basement located pulper level than a traditional doctor will do. A location in the middle dryer group 12nc or either of these if the count of dryer groups is even, is preferable for wetting device 15 (in any event, before the last dryer group of dryer section 12), as the wetting, which is critical for the tail-

4

threading event, must have time to be absorbed and spread evenly through the web, before the web reaches the end of dryer section 12. On the other hand, wetting must not happen too early, as the web may then adhere to a dryer cylinder 16.

5

Wetting device 15 is formed by a tubular bar 24, with nozzles 22 installed in it. Tubular bar 24 is attached to the frame of doctor 19. In tubular bar 24, there are nozzles 22 of a specific size, at a suitable distance to each other. In one pilot  
10 test, a 25 mm tube was used in wetting device 15, which tube was equipped with alternately located vee-jet 9503 and vee-jet 9504 nozzles at 170 mm intervals and at a distance of 280 mm from the web. The diameters of the nozzles are 1,1 mm and 1,3 mm (spraying angle 95 degree) hence the wetting device 15 is a  
15 considerably cruder arrangement than the rewetting devices 14 at the end of dryer section 12. Nozzles 22 are located in the upper edges of tubular bar 24, so that the apparatus will remain full of liquid after the valve is closed and the water pressure will be at the required level immediately the valve is  
20 reopened. The nozzles 22 of wetting device 15 are aimed at the web as it travels upwards, i.e. in front of doctor 19.

The on/off valve of wetting device 15 is completely automated and is arranged to be controlled by the machine's control  
25 system, depending on the state of the automatic threading and break systems. Fresh warm water at a pressure of 3 bar (generally 2 - 5 bar) is used for wetting.

The invention operates as follows. If a break occurs in the  
30 paper machine, the web must be tail-threaded at the reject point preceding the break point. The steam pressure in the cylinders 16 of the dryer section 12 is maintained at the production values for the whole time. Before tail threading, wetting of the paper web is begun in the middle of dryer sec-  
35 tion 12, using the devices according to the invention. Tail threading from dryer section 12 to reeler 13 is started by

5

moving the threading tail, which has been cut with a water cutter, to the middle of the machine in the cross-machine direction. Wetting is continued until the web's threading tail has been successfully blown onto reeler 13 and spread to its full width. Wetting is stopped, once the web has been, or is being spread.

## CLAIMS

1. A method in tail threading in a paper machine, in which the paper web is overdried in production by means of many  
5 dryer groups (12n) consisting dryer section (12), and in which in the starting phase the threading tail is led from one stage to the next through the paper machine to the reeler (13), after which the threading tail that has been taken to the reeler (13) is spread to its full width for production, characterized in  
10 that, in the starting phase, the dryer section (12) is set to otherwise correspond to production, except that the web is wetted (15) before the last dryer group of the dryer section (12) for the duration of the tail threading, and wetting is stopped once the web has been, or is being spread.

15

2. A method according to Claim 1, characterized in that the wetting of the paper web takes place in the middle of the dryer section (12).

20 3. A method according to Claim 1, characterized in that the moisture content of the paper web is raised to 4 - 8 %, preferably 5 - 6%.

4. An arrangement in a paper machine, which includes a  
25 multi-stage overdrying dryer section (12), rewetting devices (14), a reeler (13), and tail-threading devices, and in which in the starting phase the threading tail is arranged to be led from one stage to the next through the paper machine to the reeler (13), after which the tail is arranged to be spread to  
30 its full width by means of spreading devices characterized in that the arrangement includes wetting devices (15) in the middle of the dryer section (12) and devices controlling the wetting, which are arranged to wet the web in the tail-threading phase.

35



7

5. An arrangement according to Claim 4, characterized in that one or more wetting device (15) is formed from a tubular bar (24), nozzles (22) located in it, and a valve controlling the flow.

5

6. An arrangement according to Claim 5, characterized in that the nozzles (22) of the wetting device (15) are installed in the upper edge of the tubular bar (24).

10 7. An arrangement according to Claim 5, characterized in that the valve of the wetting device (15) is arranged to be controlled by the machine's control system.

8. An arrangement according to one of Claims 4 - 7,  
15 characterized in that the wetting device (15) is attached to the frame of the doctor (19).

9. An arrangement according to Claim 8, characterized in that the wetting device (15) is aimed at the paper web as it  
20 travels upwards, i.e. in front of the doctor (19).

(57) ABSTRACT

The invention relates to a method and arrangement in tail threading in a paper machine, in which the paper web is overdried in production by means of many dryer groups (12n) consisting dryer section (12), and in which in the starting phase the threading tail is led from one stage to the next through the paper machine to the reeler (13), after which the threading tail that has been led to the reeler (13) is spread to its full width for production.

In the starting phase, the dryer section (12) is set to otherwise correspond to production, except that the web is wetted (15) before the last dryer group of the dryer section (12) for the duration of the tail threading, and wetting is stopped once the web has been, or is being spread.

(Figure 1)

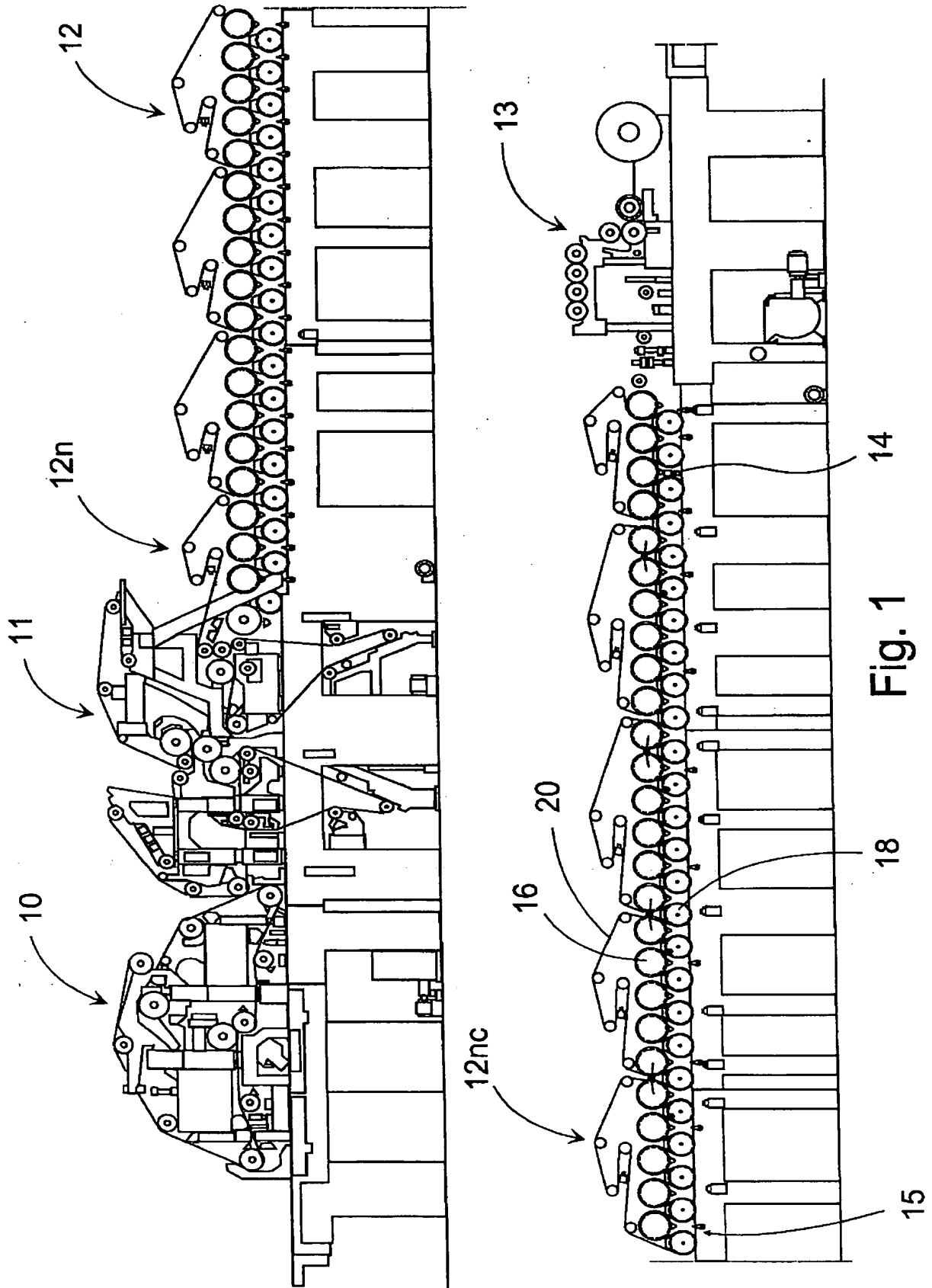


Fig. 1

L5

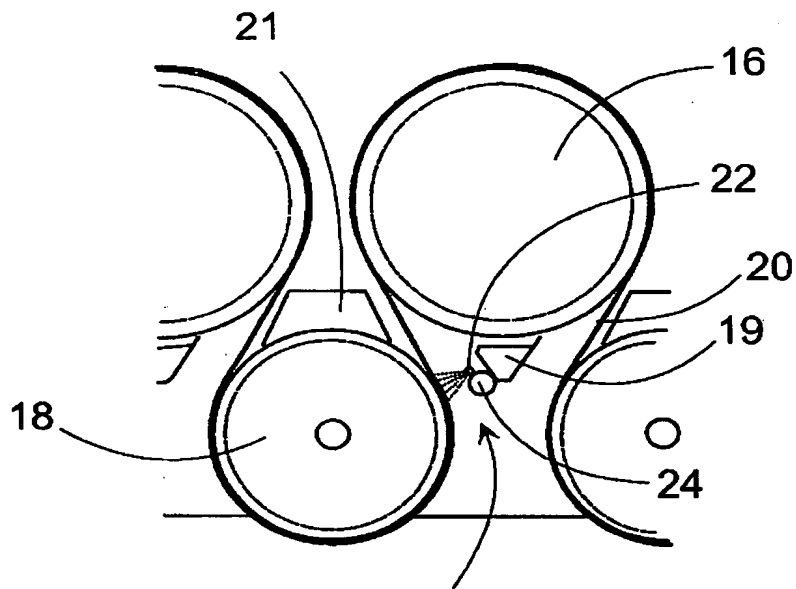


Fig. 2 15